REMARKS

Upon entry of the forgoing amendments, claims 1, 3 and 5-19 remain pending in this application. In the Office Action dated April 11, 2003, all the claims were rejected in view of the prior art. In this Reply, claims 2 and 4 have been canceled with the limitations thereof (along with certain limitations from claim 3) incorporated into independent claims 1. Independent claim 14 has been similarly amended. Applicant respectfully requests reconsideration of the rejected claims in view of the forgoing amendments and the reasons which follow.

1. Objection to the Drawings

In the Office Action, the drawings were objected to as failing to comply with 37 CFR 1.84(p)(5). In particular, the reference numeral "62" is shown in the drawings but not mentioned in the specification. Appropriate correction was request.

In the foregoing amendments, the objection to the drawings has been overcome by amending the specification to include a reference to numeral "62". No new matter has been added by this amendment. It is respectfully requested that this objection be withdrawn.

2. Rejection of Claims 1-8 Under 35 U.S.C. § 103(a) Based on Kiluk in view of Carey

In the Office Action, claims 1-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No 4,990,893 to Kiluk in view of Carey et al., "Resistance and Test-Based Outlier Rejection: Effects on Gaussian One-and Two-Sampled Inference." As explained below, the cited combination of references fails to disclose or suggest the claimed invention, particularly as now amended.

The base reference, Kiluk, discloses a method for an alarm/warning system that is intended for monitoring of service apartments for elderly and/or handicapped persons. The method involves creating a standard profile of energy consumption from data recorded over a period of time (e.g., the most recent two weeks of data). The recorded data (which includes time stamps) are used to create a reference or standard curve of "normal" values that can be compared against actual energy consumption values that are subsequently measured. This

comparison is used to generate alarms of various kinds and having various degrees of urgency to alert appropriate personnel.

The alarm/monitoring system disclosed in Kiluk is entirely conventional. In fact, it is precisely this type of alarm/monitoring system that the claimed invention is intended to improve upon. For example, the specification of the present application states the following with regard to conventional alarm/monitoring systems such as Kiluk:

> Alarm and warning systems and data visualization programs often are provided to assist in deriving meaningful information from the gathered data. However, human operators must select the thresholds for alarms and warnings, which is a daunting task. If the thresholds are too tight, then numerous false alarms are issued, and if the thresholds are too loose, equipment or system failures can go undetected.

(See paragraph [0007], page 3).

Unlike the system in Kiluk, the system of claims 1-8 does not require any human involvement or determination to set thresholds for alarms and warnings. This is not needed with the claimed invention because the outliers are detected in the measured data using a "statistical procedure" that is entirely automated (i.e., no human involvement is needed to set bounds for detecting the outliers). Because the claimed invention uses an entirely automated statistical procedure for identifying the outliers, there is no concern with an inexperienced operator setting alarm/warning thresholds that are too high or too low.

Moreover, Kiluk also differs from the claimed invention in another (and equally significant) way. In particular, Kiluk fails to use any detected outliers for "evaluating performance of the system," as required by independent claim 1. In Kiluk, by contrast, all of the detected outliers are "filtered out" (i.e., discarded) when they are detected rather than compared to the alarm/warning thresholds. This is clear from the following passages in Kiluk:

> Extreme values or values which occur only occasionally are filtered out in conjunction with this.

(Kiluk, col. 2, lines 1-3); and

> Curves of the kind illustrated in FIG. 2 are plotted for each week, and extreme values or values which occur only occasionally are filtered out.

(Kiluk, col. 3, lines 28-30). In Kiluk, persons skilled in the art would recognize these "extreme values" as the outliers, rather than the measured values that exceed that alarm thresholds. Thus, Kiluk fails to disclose or suggest "evaluating performance of the system in response to any outliers identified" as required by claim 1.

Unlike the method disclosed by Kiluk, in the invention of claim 1 the detected outliers are used to assess whether the system is in an abnormal energy consumption state. This is accomplished in the present invention by determining the number of standard deviations that a given outlier lies from the average value for utility usage. Further details of this determination are recited in dependent claim 3, which is discussed further below.

Carey fails to make up for any of the above-deficiencies noted in Kiluk. Carey simply provides a generalized discussion of the well-known GESD method for detecting outliers. There is simply no disclosure or suggestion in Carey to do anything with the outliers once they are detected, and particularly not to use them to analyze the performance of a system as in claim 1. Instead, the outliers detected in Carey are discarded, just as in Kiluk.

In view of the foregoing differences between Kiluk in view of Carey and independent claim 1, it is respectfully submitted that the rejection of claim 1 has been overcome. Additionally, claims 3 and 5-8 variously depend from claim 1 and are thus patentable over the applied combination of references for at least the same reasons. Accordingly, Applicant respectfully requests that the rejection of claims 1, 3 and 5-8 under 35 U.S.C. § 103(a) as being unpatentable over Kiluk in view of Carey be withdrawn.

Moreover, a number of the dependent claims are patentable over Kiluk in view of Carey for separate reasons. For example, dependent claim 3 recites that calculation of how many standard deviations a given outlier lies from the average for utility usage is determined by first subtracting the "***robust estimate*** of the average energy consumption" from the detected outlier value, and then by dividing this difference value by the "***robust estimate*** of the standard deviation of energy consumption." These "robust estimates" are determined

using the non-outlier data (i.e., the set of data which remains after all of the outliers have been detected and removed). Thus, the invention of claim 3 provides a robust data analysis method that utilizes both the outlier values and the non-outlier data (i.e., the data which remains after outlier have been removed from the raw data) to automatically determine if the current energy use is significantly different than previous energy patterns.

Neither Kiluk nor Carey discloses such a system or method. As explained above, Kiluk "filters out" all the extreme values (i.e., outliers) before computing the averages needed for deriving the standard curve 12. Thus, Kiluk does not use any outliers in the subsequent alarm/warning threshold determinations. Moreover, even if the values that exceed the alarm/warning thresholds in Kiluk can properly be considered "outliers" (which the Office Action apparently contends and Applicant disputes), Kiluk would still fail to disclose or suggest the invention of claim 3 for at least the reason that the standard curve to which the measured values are compared is based on all the data rather than just the non-outlier data, as would be required by claim 3. As for Carey, although it discloses the calculation of an average for the data and a standard deviation, both values are similarly based on all the data (i.e., including the outliers) rather than just the non-outlier data as required by claim 3. Hence, claim 3 is patentable over the cited combination of references for at least this reason. Claim 5 is independently patentable over the cited combination of references for similar reasons.

Claim 3 is further patentable over Kiluk in view of Carey because it requires that the z-score calculation be performed for each outlier using only data "for days of the same day type" as the outlier. In this regard, the Office Action states:

> Although, Kiluk doesn't specifically disclose performing separate comparisons, Kiluk does provide the functionally equivalent method for comparing the measurement values to the reference values with groups defined by time periods of normally similar usage (column 3, lines 24-27), ***groups of days of normally similar usage***, and groups dependent on changes in living habits (column 3, lines 46-61).

(Office Action, page 3, lines 4-9) (emphasis added). Applicant respectfully disagrees that Kiluk discloses a "functionally equivalent method" to performing separate comparisons for

assessing the system based on "groups of days of normally similar usage." There can be no dispute that Kiluk discloses the use of only a single "standard curve 12" (rather than a plurality of curves) for the alarm/warning threshold determination. There is simply no disclosure in Kiluk, let alone recognition of the problem, that a facility may have different consumption patterns for different days of the week. Hence, there can be no disclosure or suggestion in Kiluk (either expressly, inherently, equivalently or otherwise) that separate calculations should be performed on each detected outlier based only on data from days of the week having similar consumption profiles, as required by claim 3.

By contrast, the present application addresses this problem (and its solution) at length. See, for example, paragraphs [0018] through [0021] on pages 6-8. As mentioned in the specification, a manufacturing facility may have one consumption profile for Mondays, Wednesdays and Fridays, a different consumption profile for Tuesdays and Thursdays, and yet another consumption profile for Saturdays and Sundays. In such a facility, if the data for a two week period were simply time stamped and then lumped together to create a single standard curve (as disclosed by Kiluk), the result would be that most days would vary from the norm. The operator most likely need to compensate for this fact by widening the threshold values (to prevent frequent false alarms), which would result in a less accurate system than could be achieved by treating these three groups separately. Accordingly, claim 3 is patentable over the cited combination of references for at least this reason. Claims 6-7 are independently patentable over the cited combination of references for similar reasons.

3. Rejection of Claims 9-18 Under 35 U.S.C. § 103(a) Based on Kiluk in View of Carey and Further in View of Sematech

In the Office Action, claims 9-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kiluk and Carey (as applied to claims 1-8 above) and further in view of Sematech, "The Engineers Statistical Internet (ESI) Handbook: Grubbs' Test for Outliers."

The Office Action stated that "the invention of Kiluk and Carey teaches all the features of the claimed invention except for specifying what percent of a critical value indicates the occurrence of an outlier." Sematech was cited for this admittedly missing disclosure.

The invention of claims 9-13 is patentable over the cited combination for at least the reason that these claims all depend from claim 1. As noted above, the combination of Kiluk in view of Carey fails to disclose or suggest the invention of claim 1. It follows that claims 9-13 are also patentable over Kiluk in view of Carey and further in view of Sematech because the latter fails to make up the above-noted deficiencies in Kiluk in view of Carey.

The remaining claims include independent claim 14 and dependent claims 15-18. Claim 14 has been amended to further require, "evaluating performance of the system in response to any outliers identified by determining a severity of abnormal utility usage represented by a given outlier, wherein determining a severity of abnormal utility usage comprises calculating how many standard deviations the given outlier is from the average value for utility usage." As noted above in response to the rejection of claim 1, neither Kiluk nor Carey discloses this combination of features, and Sematech fails to provide the missing disclosure. Hence, claim 14 and dependent claims 15-18 are all patentable over the cited combination of references for at least the same reasons as provided above.

Accordingly, Applicant respectfully requests that the rejection of claims 9-18 under 35 U.S.C. § 103(a) as being unpatentable over Kiluk in view of Carey and further in view of Sematech be withdrawn.

4. Rejection of Claim 19 Under 35 U.S.C. § 103(a) Based on Kiluk in View of Carey and Sematech and Further in View of Jensen

In the Office Action, claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kiluk in view of Carey and Sematech and further in view of U.S. Patent No. 5,555,195, to Jensen et al.

The Office Action stated that "the invention of Kiluk and Carey teaches all the features of the claimed invention except for specifying that maintenance be performed on the system in response to the examination of one or more of the outliers." Jensen was cited for this admittedly missing disclosure.

The invention of claim 19 is patentable over the cited combination for at least the reason that this claims depends from claim 14. As noted above, the combination of Kiluk in

view of Carey and Sematech fails to disclose or suggest the invention of claim 14, and Jensen fails to make up for the deficiencies. Hence, it follows that claim 19 is patentable over Kiluk in view of Carey and Sematech and further in view of Jensen.

Accordingly, Applicant respectfully requests that the rejection of claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Kiluk in view of Carey and Sematech and further in view of Jensen be withdrawn.

5. Conclusion

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of

papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

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